Development and validation of the Zurich Meeting Questionnaire (ZMQ)

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Abstract: Introduction and objectives Research highlights the importance of identifying and examining crucial meeting characteristics and procedures. Thus, the aim of the present research is to develop and validate the Zurich Meeting Questionnaire (ZMQ), an instrument that assesses meeting attendees' perceptions of meeting design characteristics and task- and relational-oriented procedures during the meeting. Method Three independent samples (n1 = 474, n2 = 464, n3 = 311) were used to test the psychometric properties, factorial structure, criterion validity, and construct validity of the ZMQ. Results Results of confirmatory factor analyses confirmed the assumed two-dimensional structure of meeting procedures. Furthermore, the results provided criterion validity evidence regarding meeting satisfaction and perceived meeting effectiveness. Finally, the pattern of correlations with external variables (team climate inventory, psychological safety, and social desirability) provided initial evidence of construct validity. Conclusion The ZMQ is a short and psychometrically sound measure of meeting design characteristics and procedures during meetings and is suitable for use in organizational research and the evaluation of meetings in practice. Résumé Introduction et objectifs La recherche souligne l'importance d'identifier et d'examiner les caractéristiques et les procédures cruciales des réunions. Ainsi, le but de la présente recherche consiste à développer et à valider un instrument (Zurich Meeting Questionnaire [ZMQ]) permettant d'évaluer les perceptions des participants d'une réunion concernant les caractéristiques de la conception de la réunion et les procédures relatives aux tâches et aux aspects relationnels au cours de la réunion. Méthode Trois échantillons indépendants (n1 = 474, n2 = 464, n3 = 311) ont été utilisés pour tester les propriétés psychométriques, la structure factorielle, la validité de critère, et la validité de construit des échelles nouvellement développées. Résultats Les analyses factorielles ont confirmé la assumée structure bidimensionnelle des procédures de réunion. En outre, les résultats ont fourni des preuves de validité des critères en ce qui concerne la satisfaction relative à la réunion et l'efficacité perçue de celle-ci. Enfin, le schéma des corrélations avec des variables externes (l'inventaire climatique de l'équipe, désirabilité sociale, et la sécurité psychologique) fournit une preuve initiale de la validité de construit. Conclusion Nous avons conclu que le ZMQ est une mesure psychométrique solide et concise des caractéristiques conceptuelles et des procédures durant les réunions, et qu'il est adapté pour une utilisation dans la recherche organisationnelle et l'évaluation des réunions dans la pratique.

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Development and Validation of the Zurich Meeting Questionnaire (ZMQ)

[Développement et Validation du Zurich Meeting Questionnaire (ZMQ)]

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Abstract

Introduction and Objectives. Research highlights the importance of identifying and examining crucial meeting characteristics and procedures. Thus, the aim of the present research is to develop and validate the Zurich Meeting Questionnaire (ZMQ), an instrument that assesses meeting attendees' perceptions of meeting design characteristics and task- and relational-oriented procedures during the meeting.

Method. Three independent samples (N_1 = 474, N_2 = 464, N_3 = 311) were used to test the psychometric properties, factorial structure, criterion validity, and construct validity of the ZMQ.

Results. Results of confirmatory factor analyses confirmed the assumed two-dimensional structure of meeting procedures. Furthermore, the results provided criterion validity evidence regarding meeting satisfaction and perceived meeting effectiveness. Finally, the pattern of correlations with external variables (team climate inventory, psychological safety, and social desirability) provided initial evidence of construct validity.

Conclusion. The ZMQ is a short and psychometrically sound measure of meeting design characteristics and procedures during meetings and is suitable for use in organizational research and the evaluation of meetings in practice.

Keywords: work meetings, meeting satisfaction, perceived meeting effectiveness, questionnaire development

Résumé

Introduction et objectifs. La recherche souligne l'importance d'identifier et d'examiner les caractéristiques et les procédures cruciales des réunions. Ainsi, le but de la présente recherche consiste à développer et à valider un instrument (Zurich Meeting Questionnaire, ou ZMQ) permettant d'évaluer les perceptions des participants d'une réunion concernant les caractéristiques de la conception de la réunion et les procédures relatives aux tâches et aux aspects relationnels au cours de la réunion.

Méthode. Trois échantillons indépendants (N_1 = 474, N_2 = 464, N_3 = 311) ont été utilisés pour tester les propriétés psychométriques, la structure factorielle, la validité de critère, et la validité de construit des échelles nouvellement développées.

Résultats. Les analyses factorielles ont confirmé la assumée structure bidimensionnelle des procédures de réunion. En outre, les résultats ont fourni des preuves de validité des critères en ce qui concerne la satisfaction relative à la réunion et l'efficacité perçue de celle-ci. Enfin, le schéma des corrélations avec des variables externes (l'inventaire climatique de l'équipe, désirabilité sociale, et la sécurité psychologique) fournit une preuve initiale de la validité de construit.

Conclusion. Nous avons conclu que le ZMQ est une mesure psychométrique solide et concise des caractéristiques conceptuelles et des procédures durant les réunions, et qu'il est adapté pour une utilisation dans la recherche organisationnelle et l'évaluation des réunions dans la pratique.

Mots-clés: réunions de travail, satisfaction de réunion, efficacité perçue de réunion, élaboration de questionnaire

Development and Validation of the Zurich Meeting Questionnaire (ZMQ)

Employees spend significant amounts of their work time in meetings; thus, making meetings a central component of many employees' work lives (Schwartzman, 1989). Meetings are widely used to share information, solve problems, coordinate tasks, and make decisions (Tracy & Dimock, 2004). However, empirical and anecdotal data highlight that employees are often dissatisfied with meetings and view them as unproductive (Elsayed-Elkhouly, Lazarus, & Forsythe, 1997; Romano & Nunamaker, 2001).

Identifying and examining meeting characteristics and procedures is important given that attendees' perceptions of meeting effectiveness and satisfaction are highly influenced by meeting design (Cohen, Rogelberg, Allen, & Luong, 2011; Leach, Rogelberg, Warr, & Burnfield, 2009) and procedures within meetings (Nixon & Littlepage, 1992). Achieving high-quality meeting outcomes is also important due to the various consequences negative meeting outcomes could have. Not only are ineffective meetings costly (Rogelberg, Shanock, & Scott, 2012) and time consuming (Allen et al., 2012), but the quality of employees' meeting experience is also related to their well-being (Luong & Rogelberg, 2005) and overall job satisfaction (Rogelberg, Allen, Shanock, Scott, & Shuffler, 2010).

Accordingly, this study aims to develop a psychometrically sound instrument that captures and describes relevant meeting characteristics and procedures. Although some researchers have provided valuable insights into the measurement and effects of meeting characteristics and procedures, reliable and valid instruments that measure attendees' perceptions of crucial meeting characteristics and procedures are lacking. For instance, Nixon and Littlepage (1992) initially developed a measure of attendees' perceptions of meeting procedures. However, this study has several methodological shortcomings that were recently identified, so adopting Nixon and Littlepage's scale would make any future findings of limited use. Although other researchers anchored their studies and scale development either on specific meeting types or meeting procedures, this practice restricts the generalizability and

use of their scales. Davison (1999) focused his instrument development on organizational meetings, in which group support systems were used to support meeting processes, whereas Baran, Shanock, Rogelberg, and Scott (2012) focused on supervisory communication behavior in meetings and Kauffeld and Lehmann-Willenbrock (2012) examined the effects of microlevel interaction processes in meetings. Cohen et al. (2011) and Leach et al. (2009) provided important insights into the effects of design characteristics on meeting outcomes; however, the authors did not examine procedures within meetings in their studies.

Developing an efficient yet comprehensive instrument to assess attendee perceptions of critical meeting characteristics and procedures is useful for both, scientific investigation and applied purposes. The results obtained with such an instrument would allow researchers and practitioners to identify the procedures relevant for improved meeting outcomes. Furthermore, an economical and empirically tested instrument could facilitate the evaluation of the quality of meetings. Research shows that meeting groups rarely evaluate their current practices (Allen, Rogelberg, & Scott, 2008; Volkema & Niederman, 1996). Conducting a meeting evaluation with attendees is a useful technique to recognize meeting problems and inefficiencies (Allen et al., 2008). Attendees might recognize issues that meeting leaders are unaware of because research has shown that meeting leaders tend to rate meeting quality (Cohen et al., 2011) and meeting effectiveness (Leach et al., 2009) higher than attendees do.

The purpose of the current study, therefore, is to develop and test a psychometrically sound instrument that captures and describes relevant meeting characteristics and procedures within meetings. In accordance with the input–process–output models of group performance (McGrath, 1984) and previous meeting research (e.g., Cohen et al., 2011), we developed the Zurich Meeting Questionnaire (ZMQ) which measures meeting attendees' perceptions of meeting design characteristics and procedures within the meeting. The ZMQ can be completed by meeting attendees and also by meeting leaders as a form of self-evaluation.

To this end, we conducted three studies. In the first study, we developed and tested an item set that captured relevant design characteristics and meeting procedures. In the second study, we evaluated the replicability of the factor structure by using a new sample, examined the index validity, and provided initial evidence for criterion validity. The third study replicated evidence of criterion validity with an independent sample, and provided initial evidence of construct validity.

Meeting Design Characteristics and Meeting Procedures

Meeting scholars (Bostrom, Anson, & Clawson, 1993; Streibel, 2003) emphasize that meeting success is determined by the different activities carried out or behaviors shown before, during, and after a meeting. This perspective is consistent with meeting frameworks guided by the input–process–output models of group performance (McGrath, 1984). These models assume that group outcomes are influenced by both, input factors (e.g., structure of the group, use of tools) and group processes (e.g., communication, cooperation). In line with these assumptions, previous research indicated that meeting outcomes are related to the meeting design (Cohen et al., 2011; Leach et al., 2009) and attendees' perceptions of the procedures used during the meeting (Nixon & Littlepage, 1992).

Meeting Design Characteristics

Cohen et al. (2011) stated that design characteristics are related to the composition, setting, or conduct of the meeting, and they can be either planned in advance or initiated at the meeting. Collectively, these features set the direction and focus of a meeting. They help structure, organize, and create an environment that can maximize the use of time (Leach et al., 2009). Empirical evidence supports the positive effects of several design characteristics, at least to some extent, on meeting outcomes (cf. Odermatt, König, & Kleinmann, 2015).

Scholars widely advocate that each meeting participant should be invited for a clearly defined purpose (Clark, 1998; Elsayed-Elkhouly et al., 1997). Invitees should include those who are essential to achieve the stated objectives (Carlozzi, 1999) and those who are affected

by the topics to be discussed (Clark, 1998). Invitees should also include those who must be involved in a decision to be made, those who are crucial to the implementation of this decision, and/or those who have relevant expertise (Doyle & Straus, 1982).

Additionally, specific, challenging goals can affect group performance by influencing planning, tactics, and effort (O'Leary-Kelly, Martocchio, & Frink, 1994). Thus, clearly stated meeting goals can increase effectiveness by focusing the discussion and helping attendees realize when they are getting side-tracked (Nixon & Littlepage, 1992; Schwartzman, 1989). Indeed, Bang, Fuglesang, Ovesen, and Eilertsen (2010) found that goal clarity was positively correlated with the indicators of meeting effectiveness. Similarly, Nixon and Littlepage (1992) showed that clear and well-defined goals were positively associated with groups' goal attainment and attendees' satisfaction with decisions.

Scholars widely assert that an agenda is useful to guide attendees through a meeting, regulate activities, facilitate discussion, and minimize the need to backtrack (Leach et al., 2009; Volkema & Niederman, 1996). Moreover, attendees who know the agenda and the necessary background information in advance can adequately prepare for the meeting and make relevant contributions (Nixon & Littlepage, 1992). Empirical evidence supports the positive effect that an agenda has on perceived meeting effectiveness (Leach et al., 2009) and meeting quality (Cohen et al., 2011). Other researchers, however, found no positive relationship between the distribution of a written agenda and attendees' ratings of meeting satisfaction and productivity (Malouff, Calic, McGrory, Murrell, & Schutte, 2012) nor the meeting group's goal attainment (Nixon & Littlepage, 1992). The positive effect of an agenda seems to depend partly on their format (Cohen et al., 2011; Leach et al., 2009). For instance, Cohen et al. (2011) found that attendees were more satisfied with the meeting quality when a formal agenda was distributed in advance. They also discovered that ratings of meeting quality did not differ significantly between those who had a formal agenda without prior access and those who did not have a formal agenda.

The literature further highlights the usefulness of taking meeting minutes. Meeting minutes usually include a summary of the discussion, decisions made, actions to be taken, and responsibilities (Carlozzi, 1999). Taking minutes helps keep the meeting on course because progress is mapped during the meeting, and attendees feel committed to decisions made (Streibel, 2003). Nevertheless, empirical evidence on the effect of taking minutes on meeting outcomes has been mixed. Cohen et al. (2011) found no positive relationship between taking minutes and perceptions of meeting quality. By contrast, Leach et al. (2009) found a positive relationship between keeping minutes and attendees' ratings of meeting effectiveness.

The literature emphasizes that positive meeting environmental characteristics make attendees comfortable, minimize distractions, and increase attendees' focus on meeting tasks (Bluedorn, Turban, & Love, 1999; Leach et al., 2009). Weiss and Cropanzanos' (1996) affective events theory explains the importance of appropriate environmental characteristics. The theory posits that various environmental conditions influence individual affect levels (i.e., mood or emotions) and that the cumulative experience of these feelings, along with their cognitive appraisals, influence work attitudes and behaviors (cf. Cohen et al., 2011). Research has provided evidence for the importance of the meeting environment characteristics. Cohen et al. (2011) found that an appropriate meeting space, provision of refreshments, comfortable temperatures, and comfortable lighting were positively related to attendees' ratings of meeting quality. Relatedly, Leach et al. (2009) found that the quality of the facilities (e.g., rooms and equipment) was also important in predicting meeting effectiveness.

Significant empirical evidence shows that meetings should both start and end at a prescheduled time. Several studies indicate the positive relationship between starting and ending punctually and meeting satisfaction and perceived meeting effectiveness (Cohen et al., 2011; Leach et al., 2009; Nixon & Littlepage, 1992). Meetings that follow good temporal courtesy (e.g., start on time) maximize the time spent on task-related activities and allow employees to coordinate their work tasks better (Cohen et al., 2011). In this way, employees

might be less likely to perceive meetings as disruptive events that prevent them from completing their primary tasks (Luong & Rogelberg, 2005). Moreover, wasted time in meetings has both direct monetary costs (Rogelberg et al., 2012) and additional indirect costs, including employee stress and fatigue (Luong & Rogelberg, 2005) and job dissatisfaction (Rogelberg et al., 2010).

Taken together, findings from the literature highlight the importance of considering design characteristics when conducting meetings. These design characteristics primarily include procedural characteristics that can help direct attendees' attention and efforts toward task-oriented activities (e.g., inviting relevant attendees, setting clear goals, distributing agenda and preparatory materials, taking minutes). Physical characteristics that relate to the meeting environment (e.g., appropriate quality of the venue, provision of refreshments) and temporal characteristics that relate to how the meeting time is used (e.g., starting and ending on time) are also important design characteristics that need to be considered.

Meeting Procedures

Research indicates that specific procedures within meetings allow them to run smoothly and enhance attendees' perceptions of the meeting quality (Baran et al., 2012; Nixon & Littlepage, 1992). Nixon and Littlepage (1992) conducted one of the few studies on the use of meeting procedures. The authors administered a questionnaire to 67 participants. The questionnaire included 20 items that assessed several meeting procedures. The results of a principal components factor analysis with orthogonal varimax rotation yielded the following four main factors: open communication, task-oriented focus, systematic approach, and timeliness. Since Nixon and Littlepage's (1992) study was conducted, the statistical and conceptual approaches to scale development have advanced immensely (e.g., Fabrigar, Wegener, MacCallum, & Strahan, 1999; Hinkin, 1998), and several shortcomings of this study have now come to light. First, the methodological approach that the authors used is no longer consistent with current recommendations on how to explore factor structures (Fabrigar

et al., 1999). The problems identified relate to the sample size, the restriction of uncorrelated components, and the selected factor analysis method. Second, the Nixon and Littlepage study lacks several important pieces of information needed for scale development (see Hinkin, 1998). For example, they did not report scale means, the correlations between scales, and the reliability estimates for the scales. Finally, not all of the developed items measure attendees' perceptions of procedures during the meeting. Some items instead pertain to meeting outcomes (e.g., "The meetings are a more satisfying experience than a frustrating one"), design characteristics (e.g., "A written agenda is given out to members before scheduled meetings"), or related characteristics (e.g., "You attend group meetings"). Taken together, the scales developed in their study do not provide meeting researchers with a reliable and valid instrument to measure attendees' perceptions of meeting procedures. However, most items correlated with either one or both of the two criteria items. This result suggests that meeting procedures need to be considered when developing items for a meeting questionnaire.

A predominant theoretical perspective is that effective meetings integrate two fundamental types of procedures: task- and relational-oriented procedures (Beck & Keyton, 2009; Niederman & Volkema, 1999; Yukl, 2006). Task and relational orientation are widely used in the analysis of team interaction (Bales, 1950), team performance (Anderson & West, 1998), team conflict (Jehn, 1995), and team leadership (Yukl, 2006). Generally, task orientation concerns the maximization of the quality of task performance. Within meetings, task orientation is evident in a structure that emphasizes systematic communication and information analysis. As a result, attendees remain focused on accomplishing the necessary tasks while minimizing interpersonal disruptions (Beck & Keyton, 2009; Yukl, 2006). Thus, explicit structured facilitation can have a positive influence on groups' goal attainment (Nixon & Littlepage, 1992). Allen et al. (2008) found that people perceived meetings as dreadful when the meetings lacked structure or organization. Similarly, Kauffeld and Lehmann-

Willenbrock (2012) found that attendees were more satisfied with meetings when they included functional interactions, such as problem-solving and action planning.

In contrast, relational orientation concerns interpersonal relations and emphasizes the personal needs of individuals for acceptance, respect, and involvement (Niederman & Volkema, 1999; Yukl, 2006). Generally, employees evaluate whether procedural justice is displayed within the organization, that is, whether employees can influence a process or outcome, a practice often labeled “voice” (Colquitt, Conlon, Wesson, Porter, & Ng, 2001; Folger & Cropanzano, 1998). Similarly, meeting attendees value process fairness in meetings, such as having their input considered and having influence over decisions (Briggs, Reinig, & de Vreede, 2006). West (1994) proposed that the more people influence decision-making by interacting and sharing information, the more likely they are to be invested in the outcomes of decisions. Employees also place importance on interactional justice, which refers to the sensitivity with which employees are treated and relates to the extent to which they feel respected by their employer (Folger & Cropanzano, 1998). In meetings, this aspect is particularly important because employees are able to compare how their supervisor responds to their thoughts and ideas and to the thoughts and ideas of other employees (Baran et al., 2012; Beck & Keyton, 2009). Furthermore, meeting attendees are likely to be dismayed when those present do not participate because meetings are perceived as a group effort (Di Salvo, Nikkel, & Monroe, 1989) and active participation tends to promote group cohesion, consensus, and positive affect (Miranda & Bostrom, 1999). The process of developing relationships and group cohesiveness is important because cohesive groups tend to work harder to achieve group goals (Whitney, 1994). Similarly, Kauffeld and Lehmann-Willenbrock (2012) found that dysfunctional communication, such as criticizing others or complaining, is negatively related to meeting productivity and satisfaction. In sum, ensuring that all attendees have opportunities to participate can increase their sense of belonging and the extent to which they feel valued by others. Establishing good communication and

coordination practices help to achieve these goals, which also increase the feeling of group achievement and individual autonomy.

To summarize, there is a need for a questionnaire that captures meeting design characteristics and task- and relational-oriented meeting procedures. In Study 1, we report on the development of the ZMQ which asses both, meeting design characteristics and meeting procedures.

Study 1

Method

Development of the ZMQ

We developed two kinds of measures to test meeting attendees' perceptions of the (a) meeting design and (b) procedures within meetings. First, we developed a formative index that captures meeting design characteristics (nine items). In contrast to a reflective scale, a formative index includes items that are not interchangeable because no common latent construct drives the presence or absence of these various items (Bollen & Lennox, 1991). Second, we developed two reflective scales that measure how the group proceeds during the meeting (11 items).

Meeting design characteristics. We based our measurement of design characteristics on the assumption that each of the identified characteristics serves to enhance meeting outcomes. However, these characteristics also refer to different aspects of meeting design (e.g., procedural aspects or physical aspects). The different characteristics might therefore be necessary to fully capture the meeting design construct. Moreover, the various design characteristics do not need to be highly correlated; some of these characteristics might be intercorrelated (e.g., the use of agenda and a punctual end to the meeting), whereas others are not (e.g., the use of agenda and the quality of the venue). In other words, the presence or absence of each characteristic is relatively independent of each other. Therefore, we decided to create a formative measure to assess meeting design characteristics.

Formative models differ from reflective models in many aspects (cf. Bollen & Lennox, 1991; Diamantopoulos & Winklhofer, 2001; Jarvis, MacKenzie, & Podsakoff, 2003). First, in formative measurement models, the direction of causality flows from the measures to the construct (e.g., the items themselves define the construct). Second, the indicators (i.e., items) characterize a set of distinct causes that are not interchangeable because each item captures a specific aspect of the domain of the construct. As such, removing an item potentially alters the formative construct. Third, contrary to reflective models, there is no a priori assumption about whether items of a formative construct should correlate positively, negatively or not at all. Finally, in a formative model, the items are not expected to have the same antecedents and consequences. The measures do not necessarily capture the same aspects of the domain of the construct and are therefore not necessarily interchangeable.

Basing on a review of the literature involving measurements of design characteristics (e.g., Cohen et al., 2011; Leach et al., 2009; Nixon & Littlepage, 1992), we formulated nine items that assess how the identified design characteristics (e.g., agenda usage) were applied in a meeting. We summed up these items to form a composite index score (ranging from 0 to 9), which is referred to as a meeting design characteristics index. This measure is a formative index, so measures of internal consistency, such as Cronbach's α are irrelevant (cf. Streiner, 2003). Table 1 lists the nine items and the corresponding response formats. The items have different response formats as for some of the items (e.g., taking minutes, punctuality), only a dichotomous answer scale (i.e., yes/no) is appropriate: respondents either did take minutes or they did not; either the meeting started punctually or it did not. However, other items called for a scale with distinct levels because the design characteristics allowed for degrees of variance. For example, agendas can have different formats (e.g., verbal agenda, written agenda, written agenda provided in advance) or meeting venues might range from insufficient to average to very good. At the same time, we wanted to ensure that each item contributes to the same extent to the index, which made it necessary to have all items range from 0 to 1.

Meeting procedures. In accordance with previous research and theoretical conceptualizations of procedures in groups, we suggest that task-oriented and relational-oriented procedures be considered carefully. For this reason, we aimed to develop a comprehensive set of items that reflect attendees' perceptions of such procedures within meetings. To do so, we followed a deductive approach (Hinkin, 1998) whereby we generated theoretically-derived items after considering previous meeting studies, particularly that of Nixon and Littlepage (1992). Although Nixon and Littlepage (1992) did not explicitly describe a theoretical framework for meeting procedures, the results of their factor analysis provided initial evidence for the conceptual distinction between task and relational orientation. Moreover, we followed the common recommendation that scales with fewer items are preferred over those with many items (Podsakoff, MacKenzie, Lee, & Podsakoff, 2003). We subjected the items to a content validity assessment by having each of the three authors classify each item into the two dimensions. Finally, we developed five items that measure task orientation in meeting procedures. Specifically, the items were designed to tap into whether the proceedings are systematic (e.g., "The course of the meeting had a clear structure") or focused on task completion (e.g., "The exchange of information was results-oriented"). To measure the relational orientation of meeting procedures, we focused on those aspects that satisfied the personal needs of participants for acceptance, respect, and involvement. This focus corresponds to the finding of Nixon and Littlepage (1992) that showed attendee involvement and a cooperative climate, including the expression of opinions, were predictors of meeting effectiveness. Consequently, we developed six items to assess whether these aspects occurred during meetings (e.g., "The interests of the various meeting participants were taken into consideration"). Table 2 reports the final meeting procedures items. All items were rated on a 5-point scale ranging from 1 (*strongly disagree*) to 5 (*strongly agree*).

Participants and Procedures

The participants were employees of different organizations in Germany and had some level of meeting activities. We implemented a sampling strategy similar to the one used by Selenko, Batinic, and Paul (2010) by recruiting participants from a German online survey panel (Respondi AG, http://www.respondi.com). The online survey panel invites participants via a newsletter invitation and offers opportunities for its panelists to collect bonus points, which can then be exchanged for real products. We limited our sample to employed adults who attended meetings as a part of their job. In line with the definition of Schwartzman (1989), we defined a meeting as being (a) a scheduled gathering of three or more individuals for the purpose of a work-related interaction, (b) primarily attended by the employees of an organization and those with whom they work regularly, and (c) scheduled in advance. To create a consistent frame of reference across respondents and to be in line with prior research (e.g., Leach et al., 2009), we focused on meetings that lasted for more than 15 minutes but less than 3 hours and to meetings that had 25 or fewer attendees. The online survey was written in German and included the newly developed items, meeting-related variables (e.g., meeting purpose, number of attendees), and demographic questions. Throughout the survey, respondents were reminded to focus on their last meeting attended.

The online survey panel invited a random sample of 798 workers via e-mail to complete an online questionnaire. Of these contacted panelists, 501 confirmed that they attended meetings as a part of their job, and they completed the questionnaire. The remaining contacted panelists where either uninterested in filling out the questionnaire, or they were not able to answer because they do not attend meetings in their job. After excluding individuals for incomplete data, 474 participants remained in the final usable sample. Participants' mean age was 43.11 years (*SD* = 12.33); 54% were men. The majority were employed full-time (86.9%). Average tenure with their current work organization was 12.17 years. Of the 474 participants, 44.3% indicated that they supervised other employees. Participants were employed in a variety of industries (e.g., finance, health care, manufacturing, government).

Results

Meeting Design Characteristics Index

Most meeting design characteristics items showed moderate intercorrelations (*rs* ranging from .11 to .52, $p < .05$ and $p < .01$, respectively). The highest correlations were between item 1 ("setting clear goals") and item 4 ("distributing preparatory materials"; $r = .52$) and between item 3 ("agenda usage") and item 8 ("taking minutes"; $r = .46$). The mean index score was 5.80 ($SD = 1.50$, ranging from 0.25 to 9), indicating a medium-high level of meeting characteristics. Furthermore, the index correlated with both the task-oriented procedures scale ($r = .45$, $p < .01$) and relational-oriented procedures scale ($r = .40$, $p < .01$).

Task-oriented and Relational-oriented Meeting Procedures

Confirmatory factor analysis. We conducted a confirmatory factor analysis (CFA) to test the postulated and theoretically derived two-factor structure of the two subscales of meeting procedures. Since we anticipated the number of factors, as well as the items by which the factors would be represented a priori during questionnaire development, the use of CFA instead of exploratory factor analysis was more appropriate. CFA allowed us to test the pre-defined model by specifying the number of factors and their correlations as well as which items loaded on which factors (Fabrigar et al., 1999). We used AMOS 18 (Arbuckle, 2007) to conduct the CFA. Parameter estimates were made under a maximum likelihood method. Model fit was evaluated using (a) the chi-square/*df* ratio (χ^2/df), for which values below 2 suggest good model fit and below 3 acceptable model fit (Bollen, 1989); (b) the comparative fit index (CFI) and the Tucker-Lewis Index (TLI), for which values of .95 and higher indicate very good fit (Hu & Bentler, 1999); (c) the root mean square error of approximation (RMSEA), for which values of .06 to .08 indicate a good fit and values of .05 and less indicate a very close fit (Brown & Cudeck, 1993); and (d) the standardized root mean square residual (SRMR), for which values are expected to stay below .08 (Hu & Bentler, 1999).

First, we ran a two-factor model. In this model the first factor contained the six items related to relational-oriented procedures and the second factor contained the five items related to task-oriented procedures. The model allowed for factor intercorrelation. Next, we ran a one-factor model with all 11 items loading onto a single factor. Table 3 presents the fit statistics of the CFA. Overall, the proposed two-factor model fit the data better than the one-factor model. However, the two-factor model did not show exceptional fit as four indices (χ^2/df, CFI, TLI, and RMSEA) did not reach recommended standards[1].

Accordingly, we examined the standardized factor loadings, which provide more specific information about model misfit (Brown, 2006). Kline (2005) recommended that a CFA model should explain the majority of the variance of each indicator, and indicators should be used that have relatively high standardized factor loadings (i.e., > .70). Standardized factor loadings for the two-factor model ranged from .29 and .82, and all were significant at the $p < .001$ level. In particular, results showed that item 11 had a very low standardized factor loading of .29. Additionally, corrected item-total correlation for item 11 was very low and Cronbach's α of the task-oriented procedures scale increased substantially when removed. Therefore, we decided to remove item 11 from the further analyses in Study 1 and to replace this item in Study 2.

Descriptive statistics and reliability. Table 2 reports the descriptive information about the meeting procedures items. With the exception of two items, none of the items had skew or kurtosis greater than 1, indicating that items had appropriate skew and kurtosis values (Kline, 2005). The average relational-oriented subscale mean was 3.83 ($SD = 0.73$); the average task-oriented subscale mean was 3.76 ($SD = 0.70$). As one would expect, the two subscales were correlated ($r = .67$, $p < .01$) but not too highly to suggest redundancy (Tabachnick & Fidell, 2001). We assessed reliability (internal consistency) of the two scales by calculating Cronbach's α. Both subscales exhibited satisfactory reliability: the relational-

oriented procedures scale had an internal consistency of .89 and the task-oriented procedures scale had an internal consistency of .80.

Study 2

In this study, we examined whether the factor structure for the two meeting procedures subscales can be replicated in a new sample. Furthermore, we examined indicator validity of the design characteristics index as well as criterion validity by using ratings of meeting satisfaction and perceived meeting effectiveness.

Method

Participants and Procedures

The data were collected from a new sample of meeting participants from different German organizations. Recruitment arrangements paralleled those in Study 1. Of the 862 panelists contacted, 537 confirmed that they attended meetings as a part of their job, and they completed the questionnaire. After excluding individuals for incomplete data, 464 participants remained in the final sample. The mean age of the participants was 42.21 years (*SD* = 10.90); 53.4% were male. Participants' mean tenure with their organization was 12.46 years. The majority were employed full time (92%). Of the 464 participants, 46.6% indicated that they supervised other employees.

Measures

Meeting design characteristics index. We used the same nine items as those included in Study 1 to assess design characteristics.

Task-oriented and relational-oriented meeting procedures. We used the same items as those included in Study 1 with one exception. In an attempt to improve factor solution of the task-oriented procedures scale and to make this a more robust scale, a new item ("Topic-relevant information was exchanged") was developed by the researchers in accordance with the conceptual definition of the scale.

Evidence for criterion validity. We assessed two indicators of immediate meeting success. First, we measured attendees' satisfaction with the meeting. Previous research suggests that participants' meeting satisfaction is an important component of meeting success. Using affective events theory, Rogelberg et al. (2010) assert that, within organizations, meetings are powerful affect-generating events that meaningfully contribute to overall job satisfaction. They found that meeting satisfaction positively predicted job satisfaction, above and beyond individual difference variables and traditional facets of job satisfaction. Second, we measured attendees' perceptions of meeting effectiveness as another indicator of immediate meeting success. Perceived meeting effectiveness can be measured with respect to what was created or achieved during a meeting (Briggs et al., 2006). Examples of meeting effectiveness indicators include the achievement of individual or work group goals, whether employees received important information, or whether a meeting enabled collaboration (Allen et al., 2008). Attendees' perceptions of meeting effectiveness are considered a relevant outcome criterion, albeit one that might not measure actual effectiveness. Employees often complain that meetings constrain and waste their time (Allen et al., 2008). Alternatively, if employees perceive that a meeting is beneficial for their current tasks, for example, if employees attend a meeting where they receiving important task-relevant information, they may be more inclined to view meetings as a valuable resource for task completion.

Meeting satisfaction. To measure meeting satisfaction, we used a scale developed by Rogelberg et al. (2010). Participants were asked to indicate the extent to which six adjectives described their meeting (i.e., stimulating, boring, unpleasant, satisfying, enjoyable, and annoying). Ratings were made using a 5-point scale ranging from 1 (*strongly disagree*) to 5 (*strongly agree*). After reverse scoring negatively worded items, an average score was computed across the six items.

Perceived meeting effectiveness. Perceived meeting effectiveness was assessed using a three-item measure from Leach et al. (2009). Participants were asked to rate the

effectiveness of their meeting in terms of "achieving your own work goals," "achieving your colleagues' work goals," and "achieving your organizational unit's goals." Ratings were made using a 5-point scale ranging from 1 (*extremely ineffective*) to 5 (*extremely effective*). An average score was computed across the three items.

Results

Assessment of Indicator Validity of Design Characteristics Index

Most meeting design characteristics items showed moderate intercorrelations (*rs* ranging from .09 to .47, $p < .10$, $p < .05$, and $p < .01$, respectively). The mean index score was 5.68 ($SD = 1.46$, ranging from 1.5 to 9). Almost all items of the design characteristics index showed significant correlations with meeting satisfaction and perceived meeting effectiveness: *rs* ranging from .10 to .49 ($p < .05$ and $p < .01$, respectively). However, taking minutes showed no significant correlations with either meeting satisfaction ($r = .01$) or perceived meeting effectiveness ($r = .00$). Furthermore, agenda usage only showed a significant correlation with meeting satisfaction ($r = .10$, $p < .05$) but not with perceived meeting effectiveness ($r = .08$).

A recommended approach to assess the validity of a formative index (cf. Diamantopoulos & Winklhofer, 2001; Jarvis et al., 2003) is to include two theoretically appropriate reflective indicators and to estimate a multiple indicators and multiple causes (MIMIC) model (Joreskog & Goldberger, 1975). In this model, the index indicators (i.e., design characteristics items) act as direct causes of the latent variable (i.e., meeting design), which is indicated by two reflective measures (i.e., "The course of the meeting had a clear structure" from the task-oriented scale and "satisfying" from the meeting satisfaction scale). If the overall fit of the model is acceptable, this can be taken as support for a given set of items to form the index. Parameter estimates were made under a categorical estimator (i.e., asymptotically distribution-free) because of the item set's mixed response format. Estimation of the model produced an acceptable fit: $\chi^2(8) = 18.06$, $p < .05$, CFI = .97, TLI = .77, RMSEA

= .05, SRMR = .02. However, several of the items revealed nonsignificant estimates, which suggested that perhaps not all nine items should be included in the index. After we eliminated the nonsignificant indicators (items 2, 5, and 8), we re-estimated the model. The revised model, comprising only six items, also produced an acceptable fit: $\chi^2(5) = 17.05$, $p < .01$, CFI = .94, TLI = .66, RMSEA = .07, SRMR = .03. A comparison of the nine-item model with the six-item model showed no significant difference in fit ($\Delta\chi^2 = 1.01$, $df = 3$, *ns*). Although statistical properties imply that a reduced-index model also fit the data well, we decided to re-examine the index validity in a new sample in Study 3 before removing items. Each of the nine items capture different facets of the construct meeting design and it is advisable that items used as indicators cover the entire scope of the construct. Moreover, the elimination of formative items from the item pool must be theoretically justified rather than purely based on statistical properties (Diamantopoulos & Winklhofer, 2001).

Confirmatory Factor Analysis of the Two Meeting Procedures Scales

Using the same fit indices as used in Study 1, we conducted a CFA (maximum likelihood estimation) to investigate whether the factor structure for the meeting procedures scales obtained in Study 1 could be replicated and confirmed with an independent sample. The fit statistics summarized in Table 3 indicate that the two-factor model fit the data well. It also fit the data better than a one-factor model. Standardized factor loadings for the two-factor model ranged from .52 and .80 and were significant at the $p < .001$ level.

Evidence for Criterion Validity

The means, standard deviations, reliabilities, and correlations for variables in Study 2 are shown in Table 4. All of the measures had sufficient reliabilities. As expected, the design characteristics index and the two meeting procedures scales were positively correlated with meeting satisfaction and perceived meeting effectiveness, providing criterion validity evidence.

To compare the unique contribution of the design characteristics index and the two procedures scales in explaining the variance in meeting outcomes, separate hierarchical multiple regressions were conducted. In line with previous research (Cohen et al., 2011; Leach et al., 2009), we included meaningful participant background variables as control variables in the analyses. Specifically, we controlled for variables that have been shown to be related either to the predictor or the outcome variables. Table 5 provides the results from regression analyses. Using meeting satisfaction as the criterion variable, we entered the block of control variables first into the regression equation. The meeting design characteristics index, entered in the second step, accounted for 12% of the variance in meeting satisfaction. Including task- and relational-oriented procedures in step three increased the R^2 by .37. Even though task- and relational-oriented procedures were found to correlate with each other, they both had a unique role in explaining the variance in meeting satisfaction. In total, 55% of the variance in meeting satisfaction was explained when all variables were entered.

Using perceived meeting effectiveness as the criterion variable, the meeting design characteristics index, entered in the second step, accounted for 9% of the variance in perceived meeting effectiveness. Including task- and relational-oriented procedures in step three explained an additional 33% of the variance in perceived meeting effectiveness. Again, both subscales of meeting procedures had a unique role in explaining variance in perceived meeting effectiveness. However, the beta weight of the design characteristics index decreased and became nonsignificant when both meeting procedures scales were added in the third step, indicating that design characteristics no longer played a substantial role in explaining the variance in perceived meeting effectiveness. In total, 47% of the variance in perceived meeting effectiveness was explained when all variables were entered.

The results from regression analyses suggested that we test whether task- and relational-oriented meeting procedures mediate the relationship between design characteristics index and meeting satisfaction and perceived meeting effectiveness, respectively. We

followed the bootstrapping approach outlined by Preacher and Hayes (2008) as a test of the indirect effect and used Preacher and Hayes' (2008) SPSS macro, controlling for the same four background variables as we did in the regression analyses. The mediation effects were supported by the results of bootstrapping. Results in Table 6 indicate that the total indirect effect of design characteristics index on meeting satisfaction via task- and relational-oriented meeting procedures had a bootstrapped estimate of $\beta = .14$ and a 95% bias-corrected confidence interval excluding zero (CI of .10 to .17). The total indirect effect of design characteristics index on perceived meeting effectiveness had a bootstrapped estimate of $\beta = .13$ and a 95% bias-corrected confidence interval excluding zero (CI of .10 to .17).

Study 3

In this study, we re-assess the criterion validity of the ZMQ by using an extended scale of perceived meeting effectiveness. Furthermore, we provide initial evidence to establish the construct validity of the meeting procedures scales. We tested convergent validity with theoretically relevant constructs in a team context because similar processes occur in both meetings and teams. Analogous to meeting participants, team members are highly interdependent, with each team member's contributions critical to collective action. This interdependence requires coordination, synchronization, and the integration of member contributions to achieve team goals (Zaccaro, Rittman, & Marks, 2001). Thus, task and relational orientation are also important in the functioning of effective teams. Moreover, results from a study by Kauffeld and Lehmann-Willenbrock (2012) provided empirical evidence for the link between interaction processes in team meetings and team success.

We examined correlations among two established team constructs and the two meeting procedures scales. First, we used the four subscales of the team climate inventory (i.e., participative safety, support for innovation, vision, and task orientation) developed by Anderson and West (1994). Second, we measured psychological safety which represents the extent to which team members view the social climate as being conducive to interpersonal

risk, and whether individuals feel comfortable to express their opinions at work (Edmondson, 1999). Hence, team members' belief that members respect each other's competence and that team members care about each other (Edmondson, 1999) might reflect how team members work together within team meetings (e.g., it might encourages open communication).

We hypothesized that the two meeting procedures scales would be related to the dimensions of team climate and to psychological safety but would also represent unique constructs. These findings would strengthen the rationale for a measure of task and relational orientation within the context of a meeting beyond the related processes that exist within teams in general.

Finally, as we used self-reports and all items were positively keyed, respondents could have altered their responses regarding the occurrence of effective meeting behavior. Thus, we tested our new scales in relation to social desirability to establish discriminant validity.

Method

Participants and Procedures

The data were collected from a new sample of meeting participants from different organizations in Germany. Recruitment arrangements paralleled those in Studies 1 and 2. The respondents of this study were reminded throughout the survey to focus on the last team meeting attended. This explicit focus on *team* meetings was necessary because we wanted to measure additional items referring to processes within their teams (e.g., team climate, psychological safety). Of the 756 panelists contacted, 398 confirmed that they attended meetings as a part of their job, and they completed the questionnaire. The final sample included 311 respondents. The mean age of the participants was 42.57 years (SD = 10.57); 55.9% were male. Participants' mean tenure with their organization was 10.55 years. The majority were employed full time (87.7%). Of the 311 participants, 54.7% indicated that they supervised other employees.

Measures

Meeting design characteristics index. We measured the same nine items as in Study 2.

Task-oriented and relational-oriented meeting procedures. We used the same 11 items as those included in Study 2.

Evidence for criterion validity.

Meeting satisfaction. We used the same six items as those included in Study 2.

Perceived meeting effectiveness. Perceived meeting effectiveness was assessed using a six-item measure developed by Rogelberg, Leach, Warr, and Burnfield (2006). In addition to the three items used in Study 2, participants were asked to rate the effectiveness of their meeting in terms of "providing you with an opportunity to acquire useful information," "providing you with an opportunity to meet, socialize, or network with people," and "promoting commitment to what was said and done in the meeting." Ratings were made using a 5-point scale ranging from 1 (*extremely ineffective*) to 5 (*extremely effective*).

Evidence for convergent and discriminant validity of the meeting procedures scales.

Team climate inventory. The team climate inventory (Anderson & West, 1994; Brodbeck, Anderson, & West, 2000) is a self-reported measure that assesses four dimensions in group work: participative safety (12 items), support for innovation (8 items), vision (11 items), and task orientation (7 items). Participative safety refers to whether team members feel able to propose new ideas and solutions to problems in a non-judgmental climate (e.g., "Everyone's view is listened to even if it is in a minority"). Support for innovation refers to whether the team is open and responsive to change (e.g., "This team is always moving toward the development of new answers"). Vision refers to the extent to which teams have clearly defined objectives for developing new goal-appropriate methods of working (e.g., "How clear are you about what your team's objective are?"). Task orientation refers to the extent to which team members interact in promoting excellence in the team's work (e.g., "Does the team

critically appraise potential weaknesses in what it is doing in order to achieve the best possible outcome?"). All items were rated on a 5-point scale ranging from 1 (*strongly disagree*) to 5 (*strongly agree*).

Psychological safety. Psychological safety was measured using a seven-item scale developed by Edmondson (1999). Sample items include, "It is safe to take a risk on this team" and "If you make a mistake on this team, it is often held against you." Ratings were made using a 5-point scale ranging from 1 (*strongly disagree*) to 5 (*strongly agree*). After reverse scoring negatively worded items, an average score was computed across the seven items.

Social desirability. Social desirability was measured using a six-item scale developed by Kemper, Beierlein, Bensch, Kovaleva, and Rammstedt (2012). Sample items include, "Even if I am feeling stressed, I am always friendly and polite to others" and "It has happened that I have taken advantage of someone in the past." Ratings were made using a 5-point scale ranging from 1 (*strongly disagree)* to 5 (*strongly agree*). After reverse scoring negatively worded items, an average score was computed across the six items.

Results

Assessment of Indicator Validity of Design Characteristics Index

We used the same validation procedures described in Study 2. Estimation of the nine-item model produced an acceptable fit: $\chi^2(8) = 12.61$, $p = .13$, CFI = .98, TLI = .84, RMSEA = .04, SRMR = .02. However, items 5, 8, and 9 showed nonsignificant estimates. Given that the items 5 ("providing refreshments") and 8 ("taking minutes") showed nonsignificant estimates in both Study 2 and Study 3, we tested a model without these two items. The revised model, comprising only seven items, also produced an acceptable fit: $\chi^2(6) = 12.26$, $p = .05$, CFI = .93, TLI = .85, RMSEA = .06, SRMR = .03. Furthermore, the nine-item model and the seven-item model showed no significant difference in fit ($\Delta\chi^2 = 0.35$, $df = 2$, *ns*). Thus, we decided to eliminate the refreshment item and the minutes item from the index and use the reduced-index model comprising seven items for further analyses in Study

3. Inspection of the seven items still revealed sufficient breadth of content to capture the domain of the meeting design.

Evidence for Criterion Validity

Descriptive statistics for variables in Study 3 are shown in Table 4. All of the measures had sufficient reliabilities. The design characteristics index and the two meeting procedures scales were positively related to meeting satisfaction and perceived meeting effectiveness, providing criterion validity evidence in a new independent sample.

Similar to Study 2, we conducted separate hierarchical multiple regressions. Results presented in Table 5 indicated that the pattern of findings for perceived meeting effectiveness are similar to those obtained in Study 2. However, the results slightly differ when using meeting satisfaction as the criterion variable. In Study 3, the design characteristics index no longer had a unique role in explaining the variance in meeting satisfaction when both meeting procedures scales were added in the third step.

Similar to Study 2, we followed the bootstrapping approach outlined by Preacher and Hayes (2008) to test mediation effects. Results in Table 6 indicate that the total indirect effect of design characteristics index on meeting satisfaction through task- and relational-oriented meeting procedures had a bootstrapped estimate of $\beta = .25$ and a 95% bias-corrected confidence interval excluding zero (CI of .18 to .33). The total indirect effect of design characteristics index on perceived meeting effectiveness had a bootstrapped estimate of $\beta = .19$ and a 95% bias-corrected confidence interval excluding zero (CI of .13 to .25). However, considering meeting procedures individually, only task-oriented procedures had unique abilities to mediate because the 95% bias-corrected confidence interval of relational-oriented procedures including zero (CI of –.01 to .07).

Evidence for Convergent and Discriminant Validity of the Meeting Procedures Scales

Psychological safety and team climate inventory. In line with our suggestions, we found that both meeting procedures scales were associated with psychological safety and the

four subscales of team climate (see Table 4). Correlation coefficients with *rs* ranging from .52 to .61 ($p < .01$) suggest good convergent validity. Moreover the absolute values of the correlations coefficients suggest that the scales are each measuring different constructs (De Vaus, 2002). Additionally, we conducted a CFA using maximum likelihood estimation to examine the distinctiveness between meeting procedures scales and psychological safety and team climate subscales. The results indicated that a seven-factor model representing the two meeting procedures subscales, the four team climate subscales and psychological safety had the most parsimonious fit, with $\chi^2(1463) = 2634.99$, $p < .001$, CFI = .88, TLI = .88, RMSEA = .05, SRMR = .05. A specified one-factor model which included all seven measures as a single factor resulted in a worse fit; $\chi^2(1484) = 5417.01$, $p < .001$, CFI = .60, TLI = .58, RMSEA = .09, SRMR = .13.

Social desirability. Social desirability correlated moderately with task-oriented meeting procedures ($r = –.23$, $p < .01$) and with relational-oriented meeting procedures ($r = –.20$, $p < .01$). Thus, social desirability accounted for a small portion of variance in task-oriented meeting procedures ($r^2 = 5.3\%$) and relational-oriented meeting procedures ($r^2 = 4\%$).

General Discussion

The purpose of this research was to develop and validate the ZMQ as an instrument that captures and describes crucial meeting characteristics and procedures. First, we developed and tested an index of design characteristics to assess the procedural, physical, and temporal characteristics of a meeting. Second, we developed and tested two scales that assess attendees' perceptions of task- and relational-oriented procedures within the meeting itself. Overall, our three studies aimed to generate items, examine internal consistency and factor dimensionality, and assess criterion and construct validity.

Our measurement of design characteristics was based on the assumption that nine design characteristics serve to enhance meeting outcomes. However, results testing the validity of the design characteristics index suggested removing two items (i.e., taking minutes

and providing refreshment) from the index as they resulted in nonsignificant estimates in two studies. Thus, our findings confirm previous research that also found small or nonsignificant associations between those characteristics and meeting outcomes (e.g., Cohen et al., 2011).

We further argued that meetings integrate two fundamental procedures: task orientation and relational orientation. The results of CFA based on two different samples support a valid two-factor model of procedures during the meeting (task- and relational-oriented procedures). We found psychometric evidence for the two subscales, evidenced by adequate and consistent estimates of internal consistency across the three studies. However, one issue that arose from the analyses undertaken is whether a one- or a two-factor structure adequately represents the data. Although the two-factor model fit the data well (and better than the one-factor model did), the two factors were highly correlated. An explanation for this result may be that task- and relational-oriented procedures are often connected. There is considerable agreement that interaction in groups has both a task and a relational orientation (Bales, 1950), but some research also emphasizes that task and relational activities can co-occur. Poole (1983), for example, examined the simultaneity of these functions in group discussions and suggested that task processes co-occur with relational processes. Similarly, Yukl (2006) emphasized that meeting leader behavior often involves both task and relational concerns simultaneously, but the distinction helps remind leaders of the importance of balancing task and relational concerns when they lead a meeting.

For all developed measures, the results provided criterion validity evidence regarding meeting satisfaction and perceived meeting effectiveness. Attendees who reported higher levels of design characteristics and higher levels of task- and relational-oriented procedures also reported higher ratings of meeting satisfaction and effectiveness. Hierarchical regression analyses indicated that the procedures within the meeting was the strongest predictor of meeting outcomes in addition to demonstrating incremental validity over design characteristics. Moreover, bootstrapping results indicated that task- and relational-oriented

meeting procedures mediated the relationship between design characteristics index and meeting satisfaction and perceived meeting effectiveness, respectively.

Several reasons may explain why design characteristics showed smaller effects. First, design characteristics are implemented to provide an adequate structure and context, but no matter how well a meeting is designed, people do not always engage in rational, goal-directed, or instrumental behaviors. Even when meetings have structure, attendees could still stray from the discussion. Therefore, implementing certain design characteristics in an attempt to maximize meeting outcomes may be insufficient. Second, limiting evaluation of the presence or absence of certain design characteristics (e.g., agenda usage) might imply that the mere presence of a certain characteristic has a uniform effect, regardless of how this characteristic has been developed or communicated to participants (e.g., depending on their level of detail, agendas might have different effects). Finally, the impact of certain design characteristics probably varies according to meeting type. For example, Bluedorn et al.'s (1999) research on alternative formats showed that meetings in a standing format under certain circumstances can constitute an efficient and effective meeting form. Nevertheless, our study results indicate that careful consideration of meeting design characteristics is worthwhile. Moreover, identifying and validating these characteristics is the first step in learning how to design effective meetings.

We tested construct validity by examining correlations among the established measures of theoretically relevant constructs and the newly developed scales. As expected, both meeting procedures subscales were positively correlated with the four subscales of team climate (i.e., participative safety, support for innovation, vision, and task orientation) and perception of psychological safety within the team. The magnitude of correlation coefficients indicated that the concepts are indeed related to one another, but the scales do not measure the same concepts. These findings strengthen the rationale for a measure of task and relational orientation within the context of a meeting beyond the related processes that exist within

teams in general. Nevertheless, support for construct validity was not as strong as expected, and more construct validity research is clearly needed. More convincing evidence for construct validity would be reflected in stronger correlations between the relational-oriented subscales and between the task-oriented subscales, respectively. For example, participative and psychological safety might be expected to be more strongly correlated with relational-oriented meeting procedures than with task-oriented meeting procedures. However, correlations within the different subscales (e.g., within the subscales of team climate inventory) made it difficult to find differential relationships.

Finally, both meeting procedures scales were moderately related to social desirability. Although this indicated that attendees' perceptions of meeting procedures were slightly related to social desirability, based on the magnitude of correlation coefficients, discriminant validity could be established.

As with all studies, ours has some limitations. First, we used cross-sectional designs, meaning that causality cannot be established. We also calculated criterion validity coefficients by using the data collected from the same attendees who also assessed the meeting procedures and this may have inflated correlations due to common method variance problems (but see Conway & Lance, 2010; Siemsen, Roth, & Oliveira, 2010). However, all surveys used were anonymous and our sampling approach (e.g., respondent panel) ensured that all respondents knew that their individual survey responses were not shared with their employers, thus reducing common method bias. Second, in line with other studies on meeting research (Cohen et al., 2011; Leach et al., 2009; Nixon & Littlepage, 1992; Rogelberg et al., 2006), we focused on immediate meeting outcomes by measuring attendees' meeting satisfaction and perceptions of effectiveness. In particular, attendees had to assess effectiveness regarding what was created or achieved in a meeting, such as goal attainment, whether the meeting allowed for collaboration, or whether employees received important information. Their ratings therefore reflected whether meetings were a valuable resource for task completion.

However, we are concerned that these assessments might not reflect actual meeting effectiveness. Thus, the lack of an objective measure of meeting effectiveness is another limitation of this study. Finally, the questionnaire was developed and written in German because all participants were from Germany. Although the meeting procedures suggested and evaluated in this study refer to ideals such as promoting openness with opinions, fairness, and democracy, which are often considered society's most valued ideals (Tracy & Dimock, 2004), employees from different cultures might have different expectations of the structure of meetings and the roles of attendees (Köhler, Cramton, & Hinds, 2012). To increase generalizability, further research validating the ZMQ in other cultures would be beneficial.

Our results have implications for future research. First, future research should aim to use objective measures of meeting outcomes as well as criteria beyond satisfaction and effectiveness. This might involve measuring more long term effects (e.g., decision implementations) or investigating how proposed meeting design and procedures can prevent counterproductive meeting behavior (e.g., socializing during the meeting, engaging in unrelated meeting activities, or addressing someone in unprofessional terms). Moreover, it would also be beneficial to consider outcomes that are not directly related to immediate meeting success. For example, previous research has shown that supervisor actions with regard to what happens within a meeting can influence global perceptions of the supervisor (e.g., leader-member exchange; Baran et al., 2012). Because meeting groups perform a wide variety of tasks, it can be difficult to qualify all of them and directly measure outcome quality across tasks (e.g., solutions to problems, decisions). As a possible solution, conducting research in a laboratory setting may allow researchers to measure more objective meeting outcomes (e.g., comparing groups that have to solve a creativity task). Second, studies using single meetings as a level of analysis would provide additional support for the ZMQ. Such studies would allow for a precise examination of the level of member agreement about meeting characteristics and procedures within single meetings. They would also allow for a

comparison across meetings. Finally, literature suggests that for formative measures, such as our design characteristics index, measures of internal consistency, such as Cronbach's α, are not relevant (cf. Streiner, 2003). However, future studies could seek additional reliability information by using other approaches, such as test-retest reliability.

Our findings have several practical implications. We found that meeting characteristics and procedures are associated with meeting attendees' ratings of meeting satisfaction and effectiveness. Meeting leaders should be aware of these characteristics and procedures in order to improve how meetings proceed and how well the group functions (Nixon & Littlepage, 1992). To date, practitioners and consultants in the field have many options when deciding on meeting guidelines (e.g., Streibel, 2003), but few recommendations have been empirically validated in a meeting context. Our findings serve as a guide for designing and running meetings and can also be used for designing meeting training (cf. Aksoy-Burkert & König, 2015). Moreover, meeting leaders should make a conscious effort to implement and enhance the quality of meeting characteristics and procedures. Elsayed-Elkhouly et al. (1997) found that while meeting leaders can identify the key procedures required for effective meetings, a disparity exists between the usefulness of these procedures and their actual application. Meeting leaders should receive feedback on their performance in meeting planning and facilitation to promote positive change (Rogelberg et al., 2012). The ZMQ functions as an accessible and easily administered instrument to measure perceptions on crucial meeting procedures. Thus, meeting leaders can use the ZMQ evaluate current meeting practices and to implement appropriate meeting procedures.

This research provides an empirical foundation for additional research and theoretical work, and the findings have practical implications for those responsible for calling, organizing, and leading meetings. The ZMQ provides an accessible and easily administered measure of meeting characteristics and procedures and can therefore be used for scientific investigation and for applied purposes.

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Footnote

[1] The results from a supplementary exploratory factor analysis with oblique rotation also support the two-factor structure of meeting procedures. Results of this analysis can be obtained by contacting the corresponding author.

Table 1

Meeting Design Characteristics Items

	Item	Response format
1	The goals of the meeting were clearly defined [*Die Ziele des Meetings waren klar definiert*]	strongly disagree (0), rather disagree (0.25), partially (0.5), rather agree (0.75), strongly agree (1)
2	All relevant persons were present so that the meeting objective(s) could be achieved [*Alle relevanten Personen waren anwesend, damit die Meeting-Ziel(e) erreicht werden konnten*]	no (0), yes (1)
3	What kind of agenda was made? [*Welcher Art war die Tagesordnung?*]	there was neither a written nor verbal agenda nor did the meeting follow a routine format (0), there was no formal agenda provided but meeting followed a routine format (0.25), a verbal agenda was provided at the meeting (0.5), a written agenda was provided at the meeting (0.75), a written agenda was provided before the meeting (1)
4	I had all the necessary information and/or documents to prepare myself for the meeting [*Ich hatte alle notwendigen Informationen und/oder Unterlagen, um mich für das Meeting vorzubereiten*]	strongly disagree (0), rather disagree (0.25), partially (0.5), rather agree (0.75), strongly agree (1)
5	There were refreshments (e.g., drinks) at this meeting [*Es gab Erfrischungen (z.B. Getränke) bei diesem Meeting*]	no (0), yes (1)
6	The venue where the meeting took place, was . . . [*Die Räumlichkeiten, in denen das Meeting stattgefunden hat, waren . . .*]	insufficient (0), satisfactory (0.25), average (0.5), good (0.75), very good (1)
7	The meeting started at the agreed time [*Das Meeting startete zur vereinbarten Zeit*]	no (0), yes (1)
8	The minutes of the meeting were taken [*Das Meeting wurde protokolliert*]	no (0), yes (1)
9	The meeting ended at the agreed time [*Das Meeting endete zur vereinbarten Zeit*]	no (0), there was no ending time scheduled in advance (0), yes (1)

Note. Brackets enclose German items. English items were translated from German. For the final version of the meeting design characteristics index, items 5 and 8 were deleted.

Table 2

Factor Loadings, Descriptive Statistics, and Item Analysis of Task-Oriented and Relational-Oriented Meeting Procedures Items (Study 1 and Study 2)

	Item	Study 1 (n = 474)						Study 2 (n = 464)					
		λ	*M*	*SD*	Skew	Kurtosis	r_{it}	λ	*M*	*SD*	Skew	Kurtosis	r_{it}
Relational-oriented meeting procedures													
1	There were open discussions [*Es wurde offen diskutiert*]	.72	4.10	0.98	–1.07	.78	.69	.65	3.96	.90	–.84	.86	.59
2	The interests of the various meeting participants were taken into consideration [*Die Interessen der verschiedenen Meeting-Teilnehmer/innen wurden berücksichtigt*]	.82	3.71	0.96	–.73	.56	.77	.70	3.41	.94	–.36	–.33	.66
3	Decisions were made by consensus [*Entscheidungen wurden einvernehmlich getroffen*]	.75	3.75	0.98	–.91	.89	.68	.78	3.60	.94	–.45	–.06	.71
4	People listened to the contributions of meeting participants carefully [*Den Beiträgen von Meeting-Teilnehmern/innen wurde aufmerksam zugehört*]	.76	4.03	0.84	–.75	.70	.70	.76	3.89	.79	–.46	.21	.67
5	Meeting participants actively participated in the meeting (e.g., in discussions) [*Die Meeting-Teilnehmer/innen haben sich aktiv am Meeting (z.B. an Diskussionen) beteiligt*]	.71	3.76	0.83	–.37	–.09	.67	.68	3.59	.96	–.31	–.38	.66
6	Meeting participants supported each other in achieving the meeting objectives [*Die Meeting-Teilnehmer/innen unterstützten sich gegenseitig beim Erreichen der Meeting-Ziele*]	.77	3.62	0.91	–.49	.44	.71	.79	3.67	.90	–.46	.34	.72
Task-oriented meeting procedures													
7	The course of the meeting had a clear structure [*Der Ablauf des Meetings hatte eine klare Struktur*]	.62	3.71	0.95	–.64	.20	.49	.52	3.67	.96	–.53	–.19	.49
8	The individual points were processed in an efficient manner	.82	3.74	0.88	–.67	.53	.69	.78	3.77	.86	–.53	.32	.69

	[*Die einzelnen Punkte wurden in einer effizienten Art und Weise bearbeitet*]											
9	The exchange of information was results-oriented [*Der Informationsaustausch war ergebnisorientiert*]	.75	3.96	0.87	–.98	1.32	.60	.80	3.88	.85	–.49	.13	.71
10	Meeting participants' contributions were to the point [*Beiträge von Meeting-Teilnehmer/innen waren auf das Wesentliche fokussiert*]	.68	3.62	0.86	–.56	.39	.59	.71	3.65	.81	–.37	.18	.61
11	Discussions drifted off into irrelevant topics [a] [*Diskussionen schweiften zu irrelevanten Themen ab*]	.29	3.26	1.04	–.21	–.39	.26	.67	3.96	.79	–.68	1.00	.57

Note. Brackets enclose German items. English items were translated from the German items (translation/backtranslation procedure).

λ = standardized factor loading; r_{it} = corrected item-total correlation.

[a] Item 11 has been replaced in Study 2 with the item "Topic-relevant information was exchanged" [*Es wurden themenrelevante Informationen ausgetauscht*].

Table 3

Confirmatory Factor Analyses (Study 1 and Study 2)

Model	χ^2	*df*	χ^2/df	CFI	TLI	SRMR	RMSEA [90% CI]	$\triangle\chi^2/(\triangle df)$
Study 1 (*n* = 474)								
1-factor model	366.23***	44	8.3	.87	.84	.06	.12 [.11, .14]	
2-factor model	223.28***	43	5.2	.93	.91	.05	.09 [.08, .11]	142.95 (1)***
Study 2 (*n* = 464)								
1-factor model	263.96***	44	6.0	.91	.89	.17	.10 [.09, .12]	
2-factor model	130.21***	43	3.0	.97	.96	.04	.06 [.05, .08]	133.75 (1)***

Note. df = degrees of freedom; CFI = comparative fit index; TLI = Tucker-Lewis Index; SRMR = standardized root mean square residual; RMSEA [90% CI] = root mean square error of approximation [confidence interval]; $\triangle\chi^2$: difference in Chi^2 from the one-factor model.

***$p < .001$.

Table 4

Descriptive Statistics, Reliabilities, and Correlations for Variables in Study 2 and Study 3

Variable	*M*	*SD*	1	2	3	4	5	6	7	8	9	10	11
Study 2 (*n* = 464)													
1. Meeting satisfaction	3.67	0.75	(.86)										
2. Perceived meeting effectiveness	3.75	0.77	.67**	(.90)									
3. Task-oriented meeting procedures	3.79	0.65	.70**	.67**	(.82)								
4. Relational-oriented meeting procedures	3.69	0.71	.68**	.61**	.77**	(.87)							
5. Meeting design characteristics index	5.68	1.46	.39**	.35**	.43**	.36**	-						
6. Attendee was a facilitator [a]	0.19	0.39	.21**	.22**	.19**	.20**	.21**	-					
7. Age	42.21	10.90	.08	.04	.13**	.08	.10*	.06	-				
8. Supervise others [a]	0.47	0.50	.11*	.10*	.13**	.14**	.12*	.27**	.19**	-			
9. Organizational tenure (in months)	149.46	126.52	.01	.06	.11*	.05	.08	.02	.60**	.10*			
Study 3 (*n* = 311)													
1. Meeting satisfaction	3.79	0.78	(.88)										
2. Perceived meeting effectiveness	3.71	0.69	.63**	(.86)									
3. Task-oriented meeting procedures	3.84	0.64	.70**	.68**	(.80)								
4. Relational-oriented meeting procedures	3.78	0.66	.69**	.53**	.66**	(.85)							
5. Meeting design characteristics index	4.90	1.06	.37**	.38**	.46**	.40**	-						
6. Participative safety	3.80	0.66	.59**	.56**	.55**	.61**	.33**	(.92)					
7. Support for innovation	3.52	0.63	.57**	.55**	.55**	.53**	.32**	.78**	(.87)				
8. Vision	3.74	0.56	.59**	.54**	.52**	.55**	.36**	.72**	.66**	(.89)			
9. Task orientation	3.70	0.72	.59**	.52**	.59**	.57**	.34**	.74**	.74**	.71**	(.89)		
10. Psychological safety	3.85	0.75	.60**	.47**	.52**	.59**	.28**	.75**	.64**	.64**	.69**	(.84)	
11. Social desirability	2.49	0.61	–.21**	–.19**	–.23**	–.20**	–.04	–.29**	–.17**	–.27**	–.24**	–.30**	(.75)

Note. Coefficient alphas are in parentheses. [a] no (0), yes (1). * $p < .05$. ** $p < .01$.

Table 5

Hierarchical Regression Analyses Involving Predictors of Meeting Satisfaction and Perceived Meeting Effectiveness (Study 2 and Study 3)

	Meeting satisfaction			Perceived meeting effectiveness		
	Step 1	Step 2	Step 3	Step 1	Step 2	Step 3
Study 2 (n = 464)						
Attendee was a facilitator	.19**	.12**	.05	.21**	.15**	.09*
Age	.10	.09	.05	–.02	–.03	–.06
Supervise others	.04	.02	–.02	.05	.03	–.01
Organizational tenure	–.07	–.08	–.09*	.06	.05	.03
Meeting design characteristics index		.36**	.10**		.31**	.06
Task-oriented meeting procedures			.38**			.47**
Relational-oriented meeting procedures			.35**			.21**
R^2	.05	.18	.55	.05	.15	.47
$\triangle R^2$	.05	.12	.37	.05	.09	.33
F	6.15**	19.23**	77.21**	6.35**	15.45**	57.44**
F for $\triangle R^2$	6.15**	67.91**	183.22**	6.35**	49.13**	138.78**
Study 3 (n = 311)						
Attendee was a facilitator	.11	.08	.07	.18**	.15*	.14**
Age	.11	.10	.14**	.02	–.01	.01
Supervise others	.08	.00	.00	.07	–.01	–.01
Organizational tenure	.01	.00	–.05	.04	.03	–.01
Meeting design characteristics index		.32**	.03		.33**	.04
Task-oriented meeting procedures			.42**			.56**
Relational-oriented meeting procedures			.42**			.12*
R^2	.04	.14	.59	.05	.15	.47
$\triangle R^2$	.04	.09	.45	.05	.10	.32
F	3.48**	9.59**	61.25**	4.30**	10.81**	38.71**
F for $\triangle R^2$	3.48**	32.61**	164.59**	4.30**	34.93**	92.24**

Note. Regression values are standardized betas. *p < .05. ** p < .01.

Table 6

Indirect Effect of Design Characteristics Index on Meeting Satisfaction and Perceived Meeting Effectiveness Through Relational-Oriented and Task-Oriented Meeting Procedures (Study 2 and Study 3)

	Meeting satisfaction				Perceived meeting effectiveness			
			Bootstrapping BC 95% CI				Bootstrapping BC 95% CI	
	Estimate	*SE*	*LL*	*UL*	Estimate	*SE*	*LL*	*UL*
Study 2 (n = 464)								
Relational-oriented meeting procedures	.06	.02	.03	.09	.04	.01	.01	.06
Task-oriented meeting procedures	.08	.02	.05	.11	.10	.02	.07	.14
Total indirect effect	.14	.02	.10	.17	.13	.02	.10	.17
Study 3 (n = 311)								
Relational-oriented meeting procedures	.12	.02	.08	.18	.03	.02	-.01	.07
Task-oriented meeting procedures	.13	.03	.08	.20	.16	.03	.10	.23
Total indirect effect	.25	.04	.18	.33	.19	.03	.13	.25

Note. BC = bias-corrected; CI = confidence interval; *SE* = standard error; *LL* = lower limit, *UL* = upper limit.